

**PROPOSED AMENDMENT TO H.A.R. 11-54-08,  
INLAND AND MARINE RECREATIONAL WATERS  
- RATIONALE -  
Department of Health  
Environmental Planning Office  
July, 2002**

The U.S. Environmental Protection Agency (EPA) is requiring the State Department of Health to amend its Hawaii Administrative Rule, Chapter 11-54, Water Quality Standards, §08, Specific criteria. for recreational areas, in order to replace fecal coliforms with either enterococcus or *E. coli* as an indicator of fecal pollution in inland waters (waters of salinity <32.000 ppt). EPA's guidance document, titled "Implementation Guidance for *Ambient Water Quality Criteria for Bacteria – 1986*" (Draft, EPA-823-D-00-001, January, 2000), should be consulted for the reasons for this requirement; see especially section 4.3, "How should EPA's recommended water quality criteria be applied for recreational waters in tropical climates?" The requirement is stated in the guidance as follows: "If a State, Territory, or authorized Tribe does not adopt EPA's recommended bacteria water quality criteria during this period [FY2000-2002], EPA intends to act under section 303(c)(4)(B) of the Clean Water Act (CWA) to promulgate federal water quality standards, with the goal of assuring that EPA's recommended 1986 bacteria water quality criteria apply in all States, Territories, and authorized Tribes, as appropriate, by 2003" (page 4).

The criteria document on which EPA's guidance is based is titled "Ambient Water Quality Criteria for Bacteria – 1986" (EPA440/5-84-002, January, 1986).

To minimize costs and provide comparable information, Hawaii's amendment identifies enterococcus as the sole microbial indicator of the quality of recreational waters, but at two different concentrations – 33 CFU per 100 ml for inland waters (waters ≤32.000 ppt salinity) and 7 CFU per 100 ml for marine waters (waters >32.000 ppt salinity). Also, single sample maxima have been added to both the inland and marine standards. In order to establish uniform monitoring procedures, sampling periodicities have been defined identically for all surface water salinity ranges, as described in the proposed amendment to §11-54-08.

The numeric single sample maxima were computed using the formula for single sample limits from page 15 of EPA's 1986 guidance document, cited above.

For Inland Waters (salinity ≤ 32.000 ppt):

$SSM = \text{antilog}_{10} [\log_{10}(WQS_{\text{inland}}) + ((\text{curve factor}) * \log_{10} \text{standard deviation})]$ , where  $WQS_{\text{inland}} = 33 \text{ CFU}/100 \text{ ml}$  (proposed); the curve factor (0.935) corresponds to the 82% one-sided confidence level recommended for moderate full-body contact recreation; and  $\log_{10} \text{standard deviation} = 0.4$ , as calculated in the 1986 guidance for inland waters. The confidence level chosen, 82%, reflects the variable degree of full-body contact recreation existing in inland waters, including wading in shallow streams, swimming in pools below waterfalls and in deeper stream reaches, fishing in fresh and brackish inland waters (and occasionally consuming the fish) and use of watercraft of a range of sizes for paddling and swimming.

$SSM = 89 \text{ CFU enterococcus}/100 \text{ ml inland waters}$  (as reported for inland waters in EPA's 1986 guidance document; use of this published value is required by EPA rather than the value of 78 computed using the formula).

For Marine Waters (salinity > 32.000 ppt):

The federal WQS<sub>marine</sub> = 35 CFU/100 ml (current Hawaii enterococcus standard = 7 CFU/100 ml, no changes proposed); curve factor = 0.675, which corresponds to the 75% one-sided confidence level recommended for designated bathing areas;  $\log_{10}$  standard deviation = 0.676 from a statewide data set with  $n = 4,538$  samples. The confidence level chosen for marine waters, 75%, reflects the increasing use of even remote beaches by both residents and tourists and the consistently high use of Hawaii's main beaches on a year-round basis.

SSM = 100 CFU enterococcus/100 ml marine waters (this value was computed using the given formula).

At a recent meeting in Honolulu organized by the University of Hawaii, Water Resources Research Center (March 1-2, 2001), 16-18 out of 18 invited experts on the use of indicators in subtropical and tropical waters agreed that: (1) soil, sediments water and plants may be significant indigenous sources of indicator bacteria in tropical waters; (2) tropical environments change the relationship between indicators of fecal contamination and health effects observed in bathers; (3) fecal indicators can multiply and persist in soil, sediment and water in some tropical and subtropical environments; and (4) health effects associated with exposure to polluted runoff should be evaluated with the use of additional alternative indicators.

Because EPA's indicators of fecal contamination have been validated only for the association between exposure to human sewage and minor gastrointestinal illnesses, our implementation policy for this rule will restrict the use of Hawaii's recreational waters criteria for enterococcus to locations where the source has been identified with a high degree of probability as human sewage. At present, alternative indicators either lack a risk assessment or an epidemiology study, or methodologies have not been developed that are suitable for routine monitoring; these indicators are not ready for use in evaluations of health risks to bathers from exposure to polluted runoff.

Although many of Hawaii's inland waters routinely exceed the proposed enterococcus standard of 33 CFU per 100 ml, application of this criterion only in the vicinity of likely discharges of human sewage will focus attention on known health risks rather than on currently unknown effects of exposure to persistent environmental populations of this indicator. The recreational waters criteria will be updated as information becomes available on appropriate indicators of health risks, if any, associated with polluted runoff uncontaminated with human sewage.